

LING 580C—Tone and Vowel Harmony in OT
An Investigation of Kyrgyz Rounding Harmony

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1 Introduction

Kyrgyz [q(ʉ)ɾʀ(ʉ)z], a Turkic language of Central Asia, exhibits front-back and rounding harmony. There are also long and short variants of all eight vowels in Kyrgyz, the long variants having arisen not from the long vowels of proto-Turkic (Kirchner, 1998), but, most directly, from the monophthongisation of a number of older diphthongs (and triphthongs). Historically, diphthongs involving a rounded element have often resulted in a rounded long vowel, even when the “primary element” of the diphthong is unrounded. In such cases, a new head for rounding harmony is apparently created in the middle of a word. This becomes a challenge for a proper analysis, especially when the long vowel is the result of monophthongisation across a morpheme boundary. Furthermore, OT analyses of the asymmetries of Kyrgyz rounding harmony either seem unintuitive or otherwise problematic. This paper will present and scrutinise a number of analyses, hopefully coming to some conclusions about what works and what doesn't.

2 The Phenomena

2.1 Kyrgyz vowels

Kyrgyz has a four-point vowel system, as shown in table 1. The asymmetry in the point of articulation of low back vowels—technically causing there to be five points—is potentially relevant to an analysis of rounding harmony, and will be discussed in section 3.4.1.

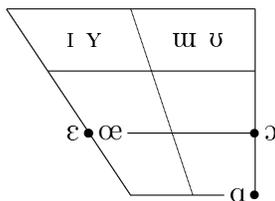


Table 1: Kyrgyz vowel inventory

Each vowel has long and short variants, which creates the following inventory of vowels: i, ii, ü, üü, e, ee, ö, öö, a, aa, o, oo, ɨ, ɯ, u, uu.¹ Vowel length appears to have no effect on rounding or backness harmony (such as the systems discussed in Kaun (2004, §2.8)), but it is relevant in that long rounded vowels are a reflex of certain diphthongs which do not trigger rounding harmony in related languages, nor would in Kyrgyz if missing what could be considered the glide element. That is, /aw/ in related languages²—and underlyingly in Kyrgyz, at least sometimes (when there’s a morpheme boundary)—is always realised as /oo/ in Kyrgyz. In Kazakh, the /w/ in /aw/ behaves as a sonorant in that it can trigger

¹This orthographic convention will be used over the IPA for the rest of the paper, as it better shows front/back harmony and is used commonly in studies dealing with Turkic languages; at the same time, it will be beneficial to keep the IPA values in mind.

²Often from */aǵ/, more distantly.

desonorisation of the following consonant (e.g., *taw-NIŋ* → *tawdɨŋ* ‘*mountain-GEN*’). While Kyrgyz has similar desonorisation processes, [oo] does not trigger it, even when its phonemic status is /a+w/—which hence is more likely /a+u/, where both phonemes have status as vowels. The [presumed] fact that this is a vowel in Kyrgyz, and not a glide as in Kazakh, would probably make the diphthongs more conducive to monophthongisation phenomena; either that, or the presumption is such: that the fact that the diphthong *surfaces* as a [long] monophthong would prevent desonorisation. Hence the status of /+u/ as a phonemic glide or a vowel is in question, as will be discussed further in section 3.4.2.2, in conjunction with other questions.

2.2 Rounding harmony

In the northern dialect of Kyrgyz (on which the written language is based), the system of rounding harmony fits Kaun (2004)’s type 7 rounding harmony pattern, as opposed to type 1, which is what she presents for Kyrgyz; instead, type 1 reflects the southern dialect. The difference between the two is easily summarised: in the southern dialect, any round vowel rounds any following vowel, whereas in the northern dialect, this is true with the exception that /u/ does not round a following /a/. A single example (Kaun, 2004, 89) captures the entire difference: the word *tuz* ‘*salt*’ with ablative morphology is *tuzdon* in the southern dialect and *tuzdan* in the northern dialect. This paper primarily examines the northern dialect.

Table 2 summarises the patterns of rounding harmony in the northern dialect by demon-

strating how harmony affects several morphemes. The morphemes presented in the table are **-(s)I**, the 3rd person possessive suffix (*‘his/her/its’*; e.g., *tuz-u ‘his/her/its salt’*), which takes the form **-sI** following a vowel and **-I** following a consonant; **-LAr**, the plural suffix (e.g. *tuz-dar ‘salts’*); **-w/-u**, a deverbal gerundive suffix (e.g. *bar-uu ‘going’*)—which will become relevant in section 2.3; **-w-LAr/-u-LAr**, the deverbal gerundive suffix plus the plural morpheme (e.g. *bar-uu-lar ‘going(s)’*); and **-w-(s)I/-u-(s)I**, the deverbal gerundive suffix plus the possessive morpheme (e.g. *bar-uu-su ‘his/her/its going’*). The columns which best demonstrate Kyrgyz rounding harmony are the **-(s)I** and **-LAr** columns.

stem	-(s)I		-LAr		-w		-w-LAr		-w-(s)I	
	Kz	Kg	Kz	Kg	Kz	Kg	Kz	Kg	Kz	Kg
-i	-i-si	-i-si	-i-ler	-i-ler	-i-w (-ū)	-üü	-i-w-ler	-üü-lör	-i-w-i	-üü-sü
-ü	—	-ü-sü	—	-ü-lör	—	-üü	—	-üü-lör	—	-üü-sü
-e	-e-si	-e-si	-e-ler	-e-ler	-e-w	-öö	-e-w-ler	-öö-lör	-e-w-i	-öö-sü
-ö	—	-ö-sü	—	-ö-lör	—	-öö	—	-öö-lör	—	-öö-sü
-ä ³	—	—	—	—	—	—	—	—	—	—
-a	-a-si	-a-si	-a-lar	-a-lar	-a-w	-oo	-a-w-lar	-oo-lor	-a-w-i	-oo-su
-o	—	-o-su	—	-o-lor	—	-oo	—	-oo-lor	—	-oo-su
-ı	-ı-sı	-ı-sı	-ı-lar	-ı-lar	-ı-w (ū)	-uu	-ı-w-lar	-uu-lar	-ı-w-i	-uu-su
-u	—	-u-su	—	-u-lar	—	-uu	—	-uu-lar	—	-uu-su

Table 2: Demonstration of Kyrgyz (and Kazakh) rounding harmony and monophthongisation

³Kyrgyz is generally considered to lack a distinct /ä/ phoneme. In non-initial syllables, Kazakh does not have phonemic /ä/ or round vowels (with some exceptions), and single-syllable stems don’t generally end in a vowel (potentially with exceptions, but none which are apparent after some investigation). These forms can be considered to be unattested, and are indicated in the table with a ‘—’.

2.3 Monophthongisation and rounding

In Kyrgyz, a gerundive can be formed with the morpheme /u/. Table 3 demonstrates the gerundive forms resulting from the addition of this morpheme to verbs ending in a consonant stem and each vowel (also see forms in table 2).

stem phoneme	verb stem	gerundive	meaning
i-	<i>eri-</i>	<i>erüü</i>	‘melt’
ü-	<i>süŋgü-</i>	<i>süŋgüü</i>	‘dive’
e-	<i>biyle-</i>	<i>biylöö</i>	‘dance’
ö-	<i>tölö-</i>	<i>tölöö</i>	‘pay’
a-	<i>qara-</i>	<i>qaroo</i>	‘watch’
o-	<i>boljo-</i>	<i>boljoo</i>	‘guess’
ɪ-	<i>taanɪ-</i>	<i>taanuu</i>	‘be acquainted’
u-	<i>oqu-</i>	<i>oquu</i>	‘read’
C-	<i>jeŋ-</i>	<i>jeŋüü</i>	‘win’

Table 3: Verb stems plus gerundive /+u/

The most interesting forms are the ones in which a round long vowel is created *in a word which otherwise would have only unrounded vowels*, as seen in table 3 in words with unrounded vowels ending the roots. In such cases, the new long round vowel becomes a head for vowel harmony; that is, all following vowels are rounded (except /a/ after /u/, of course), despite the fact that the stem ends in an unrounded vowel. This is depicted in the examples in (1).

- (1) a. *kara* – *u/w* – *sIz*
 look – GER – without
 Kg. *qaroosuz*, Kz. *qarawsız*, ‘without looking’

- b. *biyle* – *u/w* – *sIz*
dance – GER – without

Kg. *biylöösüz*, Kz. *biylewsiz* ‘without dancing’

In Kazakh, which exhibits rounding harmony (though “weaker” than in Kyrgyz, and not [usually] reflected in the orthography), but not monophthongisation (at least not as part of the standard language), the diphthong is formed without any interesting phonology, and no head for rounding harmony is created. The Kazakh forms are given alongside the Kyrgyz forms in (1).

3 Analyses

Serious analyses in Optimality Theory strive to be grounded in phonetics. In this paper, criticism of previous analyses and attempts to find something that works will be borne from this aim.

3.1 Monophthongisation

A simple OT analysis of the monophthongisation phenomena in Kyrgyz would include the constraints in (2), with the ranking in (3)

- (2) a. *DIPHTHONG — diphthongs are bad; assess a violation when a diphthong occurs
b. MAXMORA — for each mora, have a segment; assess a violation if a mora isn’t realised

- c. IDENT[+HI,+LO,+RD] — the features +high, +low, and +round should be preserved from the input; assess a violation if a +high, +low, or +round feature isn't preserved⁴

(3) *DIPHTHONG » MAXMORA » IDENT[+HI,+LO,+RD]

Tableau 4 demonstrates this ranking in effect for /au/ → [oo]. This ranking also works for the other monophthongised diphthongs of Kyrgyz, as shown for /eu/ → [öö] in tableau 5, and /iu/ → [üü] in tableau 6. Note that it's assumed that /u/ is fronted to [ü] in front-vowel environments via regular front/back harmony processes not discussed in this paper.

/kara + u/	*DIPHTHONG	MAXMORA	IDENT[+HI,+LO,+RD]
a. qarau	*!		
b. qaroo			
c. qaraa			*!*
d. qaruu			*!
e. qaro		*!	
f. qarΛΛ			*!

Table 4: /kara + u/ → [qaroo]

3.2 Rounding Harmony

The simplest explanation for rounding harmony is the articulatory reality pointed out by Kaun (2004, 99-100)—that once rounding begins, the lips stay rounded until the end of the

⁴Note that this should probably be thought of as three separate constraints ranked at the same level.

⁵This raises the question of whether /e/ is a mid or low vowel in Kyrgyz; /o/ and /ö/ are being considered mid, while /a/ is being considered low; /e/ is the phonemically front version of /a/.

/biyle + u/	*DIPHTHONG	MAXMORA	IDENT[+HI,+LO,+RD]
a. biyleü	*!		
b.  biylöö			
c. biylee			*!(?* ⁵)
d. biyluu			*!*
e. biylö		*!	

Table 5: /biyle + u/ → [biylöö]

/eri + u/	*DIPHTHONG	MAXMORA	IDENT[+HI,+LO,+RD]
a. eriü	*!		
b.  erüü			
c. erii			*!
d. erü		*	

Table 6: /eri + u/ → [erüü]

phonological word; however, the asymmetry of vowel harmony in Kyrgyz—that is, that /u/ doesn’t round /a/—complicates this. The generalisation could be extended to something like “once rounding begins, the lips stay rounded until the end of the phonological word or an /a/ following an /u/.” This may have an intuitive feel—that /u/ isn’t quite strong enough to round the resilient /a/ phoneme—but this anecdotal answer is unsatisfactory. The analyses presented in this paper—both previous analyses and thoughts on other possibilities—attempt to account for this complication in various theoretical frameworks, though primarily in grounded OT—which should in turn connect them to the intuitive anecdotal answer.

3.2.1 Kaun

Kaun (2004)'s OT analysis of the rounding harmony pattern present in northern/standard Kyrgyz uses the constraints in (4), with the ranking presented in (5).

- (4) a. ALIGN-L/R ([RD/−BA], PRWD) — when [round] and [−back] coöccur, they align with edge of word
- b. ALIGN-L/R ([RD/−HI], PRWD) — when [round] and [−high] coöccur, they align with edge of word
- c. GESTUNI[RD] — “vowels within a rounding harmony span... share the same height specification” (Kaun, 2004, 105); assess a violation when consecutive round vowels are of different height
- d. ALIGN-L/R ([RD], PRWD) — roundness autosegment is aligned with edge of word; “one violation... is assessed for each docking site (vowel) following the last docking to which a [round] autosegment is linked” (Kaun, 2004, 104)
- (5) ALIGN[RD/−BA], ALIGN[RD/−HI] » UNI[RD] » ALIGN[RD] » *others*

Unfortunately, (Kaun, 2004, 104) does not discuss when a violation of the more complex align constraints is assessed. It would seem that they are a lot like ALIGN-L/R ([RD], PRWD), in that a violation is assessed if rounding does not spread, but only if the head for rounding is the sort “being aligned”; however, without explicit statement or demonstration of this, it is difficult to be sure, though this explanation does seem to produce correct output. Tableaux 7, 8, and 9 take examples from Kennedy (2004); it is up to the reader to determine whether violations to the two most highly ranked constraints are being assessed correctly.

/tut + GAn/	ALIGN[RD/-BA]	ALIGN[RD/-HI]	UNI[RD]	ALIGN[RD]
a. tut-qan	?	?		*
b. tut-qon	?	?	*	

Table 7: /tut + GAn/ → [tutqan]

/bol + GAn/	ALIGN[RD/-BA]	ALIGN[RD/-HI]	UNI[RD]	ALIGN[RD]
a. bol-ğon	?	?		
b. bol-ğan	?	*?		*

Table 8: /bol + GAn/ → [bolğon]

/kül + GAn/	ALIGN[RD/-BA]	ALIGN[RD/-HI]	UNI[RD]	ALIGN[RD]
a. kül-gön	?	?	*	
b. kül-gen	*?	?		*

Table 9: /kül + GAn/ → [külgön]

Despite the opacity of the constraints, the intuition behind what the analysis is going for is fairly simple. Terbeek’s study, referred to by Kaun (2004, 94-95) determined that of rounded vowels, high back ones (/u/) were perceived as most rounded; perhaps this is due to another fact—that of vowels, it is least marked for high back ones to be rounded (not to mention marked for them to be unrounded). Kaun goes on to argue that this markedness causes high back vowels to be poor triggers for rounding harmony. Additionally, /a/ is a poor candidate for rounding because it is low.⁶ In the case of /u/ not triggering rounding of

⁶By Kaun (2004)’s reckoning, it’s more that low vowels (/o/) are a better trigger for vowel harmony than that /a/ is a poor target.

/a/ in Kyrgyz, the ranking of Kaun’s constraints to deal with the interaction these phonetic realities outranks the constraints to preserve uniformity of rounding articulation.

One problem with this analysis is that the contrast between southern and northern Kyrgyz dialects (presumably one of a minor constraint reordering), which can be seen as a difference between types 1 and 7, respectively (see Kaun, 2004, 106), turns out to be somewhat significant: type 7 is basically three other constraints ($\text{ALIGN}[\text{RD}/\text{-BA}]$, $\text{ALIGN}[\text{RD}/\text{-HI}] \gg \text{UNI}[\text{RD}]$) ranked above the constraints of type 1 ($\text{ALIGN}[\text{RD}] \gg \text{others}$). As is apparent, this is not a simple case of reranking, especially when seen within Kaun (2004)’s framework which deals just with rounding harmony. In an OT analysis, the contrast between southern and northern dialects of Kyrgyz should turn out to be fairly minimal—perhaps a case such as one constraint having risen above a few others; three seems excessive for such similar linguistic varieties. The difference in constraint rankings between the two systems should also more intuitively represent the difference in data, which is only that any rounded vowel triggers the rounding of any other vowel until the end of the phonological word (in the southern dialect) and that there’s an exception of /u/ not rounding a following /a/ (in the northern dialect); again, this difference should not be one of three risen constraints.

When thought of intuitively, however, this difference could be due to a constraint such as $\text{UNI}[\text{RD}]$ rising above a couple other constraints in southern Kyrgyz (or sinking below the others in northern Kyrgyz, though this is less likely the case). Indeed, the previous argument against this analysis could be refuted if it turned out that the three higher constraints in the northern dialect were right below $\text{ALIGN}[\text{RD}]$ in the southern dialect, retaining their ranking

order; if this were the case, it could be said that it isn't that three constraints are higher in the northern dialect, but that one constraint is lower. At the same time, it seems likely that the northern Kyrgyz system was the original system, and that the difference is due to the rising of ALIGN[RD] in the southern dialect. If this is the case, the constraint rose three positions, which still seems like a lot.

In the end, Kaun's analysis considers /u/ a weak trigger and /o/ a better trigger, which seems right (i.e., intuitive, but also phonetically/articulatorily grounded). It would be interesting to examine the specific ranking of these constraints in southern Kyrgyz more closely, and consider which—if not both—of those two facts is not active in the phonology of southern dialect (i.e., more lowly ranked), enabling a more “symmetric” system of rounding harmony. It would also be interesting to examine the role of /a/ as a resiliently unrounded vowel in systems such as Kaun (2004)'s type 8, where /a/ never rounds, but everything else does—that is, whether Kaun's GESTUNI constraint to keep vowels which agree in rounding to agree in height too is indeed the right sort of constraint to be using.

3.2.2 Kennedy

Kennedy (2004) approaches the problem of rounding harmony in standard Kyrgyz somewhat differently than Kaun (2004), and the OT analysis reflects this. He proposes the constraints in (6) and the ranking in (7).

- (6) a. DEP[-BK] — don't make vowels front; assess a violation if a [-back] specification existing in the output does not originate from the input

- b. DEP[+RD] — don't round vowels; assess a violation if a [+round] specification existing in the output does not originate from the input
- c. ALIGN[-BK]-R — [-back] spreads to the right (front/back harmony); assess a violation if [-back] is not associated with the right-most vowel
- d. *o — no [+round,+back,+high] vowels;⁷ assess a violation if /o/
- e. ALIGN[+RD]-R — [+round] spreads to the right (rounding harmony); assess a violation each landing point (vowel) that [+round] does not spread to⁸

(7) DEP[-BK] » DEP[+RD] » ALIGN[-BK]-R » *o » ALIGN[+RD]-R

Tableaux 10, 11, and 12 demonstrate Kennedy's analysis in action.

/tut + GAn/	DEP[-BK]	DEP[+RD]	ALIGN[-BK]-R	*o	ALIGN[+RD]-R
a. tut-qan					*
b. tut-qon				*	

Table 10: Demonstration of Kennedy's analysis: /tut + GAn/ → [tutqan]

/bol + GAn/	DEP[-BK]	DEP[+RD]	ALIGN[-BK]-R	*o	ALIGN[+RD]-R
a. bol-ğon				**!	
b. bol-ğan				*	*

Table 11: Demonstration of Kennedy's analysis: /bol + GAn/ → [bolğon]⁹

⁷A "don't round /a/" version of this might seem more intuitive, as will be discussed later.

⁸Identical to Kaun (2004)'s ALIGN-L/R ([RD], PRWD), as will be discussed later.

⁹This tableau differs from Kennedy (2004, 6)'s tableau 28, but I believe that that version is missing the assessment of a violation.

/kül + GAn/	DEP[-BK]	DEP[+RD]	ALIGN[-BK]-R	*o	ALIGN[+RD]-R
a. ☞ kü-l-gön					
b. kü-l-gen					*!

Table 12: Demonstration of Kennedy’s analysis: /kül + GAn/ → [külgön]

As seen in tableau 11, Kennedy (2004)’s analysis appears to predict incorrect results. It will be left to the reader to determine whether something has been overlooked or misinterpreted; further thought is obviously needed, but this specific issue will be ignored in this paper.

Kennedy (2004, 7) recognises that Kaun’s *RoLo has a “similar intuition as *o” (though it is interesting to note that Kaun does not employ *RoLo in her analysis of northern Kyrgyz-like rounding harmony, although it seems potentially useful). However, *RoLo *cannot* be simply substituted for *o—because *ö would be included as well—as shown in tableau 13 (which parallels tableau 12). To make Kennedy (2004)’s analysis work using *RoLo, it would have to employ other constraints—such as Kaun (2004)’s *RoFro perhaps—and be rethought.

/kül + GAn/	DEP[-BK]	DEP[+RD]	ALIGN[-BK]-R	*RoLo	ALIGN[+RD]-R
a. ☹ kü-l-gön				*!	
b. ☞ kü-l-gen					*

Table 13: Demonstration that *RoLo cannot be substituted for *o in Kennedy’s data

The constraint *o can be problematic for OT—if *o is posited, then to be universal, there must be a universal constraint like *PHONEME[X]¹⁰ which has a version for each phoneme

¹⁰Or possibly *FEATURE[X], but that’s less to the point here.

of a given language. Unfortunately, OT doesn't really have a concept of phonemes, as such (cf. "richness of the base"). Instead, *o should be thought of more as a constraint against applying roundness to any [-high,+back] vowel which has no particular investment in being autosegmental or not. In many ways, this constraint—and any markedness constraint—is a carry-over from pre-OT days, though it is also phonetically grounded.

3.3 Putting it together

As originally mentioned, part of the goal of this paper was to determine how the two Kyrgyz processes considered—monophthongisation and vowel harmony—interact. To summarise the interaction: diphthongs with unrounded "primary elements" become long rounded vowels, which in turn become a new root for rounding harmony, which applies regularly through the rest of the word. Assuming that the three OT analyses presented in sections 3.1, 3.2.1, and 3.2.2 are "correct" (in that they are descriptively accurate, and solve the problems at hand), one way to combine them would be to place the constraints which provide a solution for the monophthongisation problem (preserving the ranking, of course) above either of the other two sets of constraints. This should work (i.e., produce the correct output), since valid candidates of the monophthongisation process have no violated constraints. This solution seems hackish, though, and without a more in-depth analysis of Kyrgyz, would at best be ad-hoc. In "reality", the constraints are probably interwoven in a slightly more opaque way.

Either way, it would seem that interaction between monophthongisation and vowel harmony is not a huge problem for a constraint-based model such as OT. Even a rule-based

model would most likely just apply rules for rounding harmony after rules for monophthongisation. A purely autosegmental model would be where the worst complications lie; fortunately for the author of this paper, these are not explored in any depth (cf. section 3.4.1).

3.4 Other possibilities and issues

3.4.1 Other possibilities

The discussion to this point has focussed on previous OT analyses. There are other possibilities which are worth mention, but which will not be explored in any depth in this paper.

One such possibility involves the fact that /a/, as shown in table 1 and mentioned at other points in this paper, is lower than /o/, causing a slight asymmetry in the vowel inventory of Kyrgyz. This suggests that /a/ might not just be phonetically asymmetrical, but phonemically asymmetrical as well—that is, having a different feature set than would be expected from an unrounded version of /o/. Considering that /a/ *does* round to /o/ (though only after /o/, not after /u/), it would seem that this isn't the entire story. Perhaps what's going on looks something more like this: /a/ is specified as [-high,+low(,-round)], and /o/ is only specified as [+low,+round]. In this version of the story, the [-high] feature of /a/ would somehow prevent the spreading of [+round] from a [+high] vowel. If analysed autosegmentally, this might be accomplished by blocking against tier-crossing.¹¹

¹¹See Kennedy (2004) for a reference to and summary of Mester (1986) for an example of such an analysis.

Another possibility, within OT, might be to refer to the sonority hierarchy, where /a/ is more sonorous than /u/. This has a similar intuition to what the feature-based analysis and Kaun (2004)'s analysis strive for.

The feature-based analysis just discussed assumes a system where not all available features have to be specified, and also assumes that the “mid” vowels in Kyrgyz are as low as I’ve said they are: in closely related Kazan Tatar, the mid vowels have become almost cardinal high vowels and the high vowels have become very reduced mid-central vowels; in even more closely related Kazakh, the high vowels are very short and either quite low or quite lax, and the “mid” vowels have a high onglide (but /a/ and /ä/, perhaps obviously, do not). The proto-system that resulted in Kazakh and Tatar also resulted in Kyrgyz; the similarities between the vowel systems of Kazakh and Tatar (i.e., mid vowels aiming for high, and high vowels reducing), and the general evidence that Kazakh and Kyrgyz are more closely related than either is to Tatar,¹² suggest the common proto-system was more like Tatar or Kazakh, and that the question as to the validity of the presented vowel system for Kyrgyz (and the nature of vowels in Kyrgyz and related languages in general) is one worthy of investigation.

3.4.2 Issues

3.4.2.1 OT

A somewhat minor issue, and one somewhat specific to OT analyses, is the fact that some constraints seem to have duplicate functions. For example, ALIGN-L/R ([RD], PRWD)

¹²Though there’s some evidence that Kyrgyz was once more closely related to the northern branch of Turkic, and less closely related to Kazakh and Tatar (Kirchner, 1998).

(as used by Kaun) looks like ALIGN[+RD]-R (as used by Kennedy (2004)), AGREE[+RD] (as mentioned by Kennedy (2004, 5) as being equivalent to ALIGN[+RD]-R, and attributed to Bakovič (2000)), and a constraint SPREAD[+RD] (generic autosegmental-style feature-spreading), and *o (as used by Kennedy) looks like *ROLO (as was discussed in section 3.2.2). It has always been standard practice when working within OT to make an attempt to recycle already posited constraints and not to create one's own without [phonetic] studies to ground it. At the same time, a-priori constraints are used when they seem the only way to solve a problem, and are backed up with clear explanations as to when a violation is assessed and what is trying to be accomplished.

In a very real sense, much of OT exhibits not just traces or remnants of pre-OT phonology, but is a wholesale conversion of existing ideas and devices into a new system. The argument that OT is simply a computational device that makes older generative theories of phonology more discrete seems very rational in light of this specific issue in Kyrgyz, especially that there are two analyses which seem to work.¹³ The fact that constraints can be, well, almost anything (such as *o), begs for reform of the application of the theoretical framework.

In that respect, I'd say that *o (in the phonetically intuitive sense of "low vowels don't like to round, and back ones even less so than front ones"¹⁴) could be seen as the interaction between several much more universal constraints, probably similar to how Kaun dealt with a related issue using the ALIGN constraints. The fact that these constraints exist in all

¹³My issues getting the two analyses to work (due to lack of understanding, perhaps) aside.

¹⁴Which doesn't seem right, on some level, since back rounded vowels are cross-linguistically so much less marked than front rounded vowels, as Kaun (2004)'s *ROFRO accounts for.

languages isn't even necessarily the case—just that the reality of human articulation is [fairly universally] such that these constraints have the universal potential (and perhaps even motivation) to arise in any human language.

3.4.2.2 Definition of phonemes

Another issue encountered in this study which is worthy of further investigation concerns the nature of phoneme delineation. In section 2.2, I operated under the assumption that the gerundive morpheme is **-u** in Kyrgyz and **-w** in Kazakh. However, as was seen in table (3), after a consonant in Kyrgyz, the morpheme takes the form /uu/ (and in Kazakh, the general assumption is that it takes the form /iw/, though this often sounds more like /u:/ and is represented orthographically with one character). This brings into question whether the morpheme is indeed **-u/-w**, and if so, what sort of process causes the extra segment when the morpheme is used after a consonant.¹⁵ Referring back to table 2, the last column provides evidence in favour of Kyrgyz **-u** and Kazakh **-w**: the forms in Kyrgyz take the version of the morpheme **-(s)I** which would follow a vowel, and the Kazakh forms take the version which would follow a consonant. It still remains to be determined, however, whether the Kyrgyz **-u** is only superficially a vowel, and remains a consonant underlyingly.

Also, considering strong evidence for a Mongolian-like tense/lax harmony in Kazakh, as well as a lack of true front high and mid vowels—which are instead central—(Vajda, 1994), and the high level of similarity (not to mention mutual intelligibility) between Kazakh and Kyrgyz, an in-depth phonetic analysis of Kyrgyz vowels is called for before the issue can

¹⁵The morpheme was historically **-IG**, which can still be found, e.g., in Uyghur as **-iq**.

be drawn to a close. The issue of whether there is an asymmetry in the vowel inventory—making it a five-point system as opposed to a very symmetric four-point system—which has been referred to several times in this paper,¹⁶ is further reason for such an analysis.

4 Summary (Abstract-in-the-past-tense)

This paper aimed to take two separate phenomena in Kyrgyz—monophthongisation of diphthongs into long round vowels and an asymmetric system of rounding harmony—which interact together—the long round vowels resulting from monophthongisation become heads for rounding harmony where the head of the original diphthong would not have—and develop a joint OT account of the systems. Two previous analyses of the rounding harmony issue—Kaun (2004) and Kennedy (2004)—were presented, and a simple solution for the monophthongisation issue was developed. The previous issues of rounding harmony have proven problematic in different ways: with Kaun (2004)’s solution, it was difficult to determine when constraint violations were assessed, and Kennedy (2004)’s solution raises other questions about OT. Despite this, combining either analysis with the solution for monophthongisation would not be difficult, but would be ad-hoc without further analysis. Additional thoughts were presented, appealing for in-depth phonetic analyses of Kyrgyz vowels, and vaguely, for reform in OT.

¹⁶As well as the perhaps already determined issue of whether Kyrgyz has /ä/ or not, as pointed out in footnote 3.

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